

***sat-nms* MNC**

**Monitoring & Control System**

**Installation Manual**

Version 1.2 / 2009-04-21

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SatService Gesellschaft für Kommunikationssysteme mbH  
Hardstrasse 9  
D-78256 Steisslingen

□

[www.satnms.com](http://www.satnms.com)  
[www.satservicegmbh.de](http://www.satservicegmbh.de)  
Tel +49 7738 97003  
Fax +49 7738 97005

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## Introduction

This manual describes the basic steps how to install and maintain a **sat-nms** monitoring & control system (M&C). It complements the online help / user manual of the software. While the user manual primarily explains the usage of the software's user interface including aspects of configuration and setup, the installation manual contains the following topics:


The chapter '[Installation](#)' describes how to install the M&C system hardware and how to do a first setup of the M&C system. It also includes a description how to install the user interface software on a MS Windows based computer.

Chapter '[Administration](#)' deals with administrative tasks like making backups or maintaining the M&C user list.

There is a chapter '[Crash Recovery](#)' on its own which explains step by step how to re-install operating system and application software on a M&C computer where the hard disk had to be replaced.

Finally, the '[Appendix](#)' provides some reference information, amongst other things a complete list of serial interface boards which fit into the M&C system including a description how to install them.

This manual covers also the new version of the M&C system which SatService delivers since March 2003 with serial numbers greater or equal 1020. Changes in the documentation for the new M&C systems are marked with the .i new.gif label.

 The Chapter '[setup program](#)' describes the new setup program for the M&C system configuration.

Version 1.2 / 2009-04-21

## Installation

The installation of a **sat-nms** M&C system principally consists of five major steps. Depending on what you have purchased from SatService GmbH not all of these steps will be applicable for you.

**NEW** For the configuration steps 2 and 3 the new version provides a [setup program](#).

### 1. [Installation / cabling](#)

As a first step you have to mount the M&C computer into the rack and connect it to the devices it shall control.

### 2. [Serial interface configuration](#)

In most cases you will be able to skip this. You surely will have purchased the M&C system with the number of serial interfaces you require. Nevertheless, this manual contains a guidance how to add more serial interface to the M&C system.

### 3. [Network configuration](#)

The M&C system will work on it's own, without any network link installed. To use features like operating the M&C from another computer or remote assistance from SatService GmbH, you will however have to connect the M&C to a local area network. This manual describes how to do the necessary network parameter settings at the M&C computer.

### 4. [Client installation](#)

The M&C system is able to be remotely operated from any MS Windows or Linux based computer. A network link to the M&C system (permanent or dial-up) is the only prerequisite. A chapter of this manual instructs how to install the user interface software on a client computer.

### 5. [Configuration / setup](#)

The M&C system must be configured for it's application before you can use it. While this is a considerably subject on it's own, this manual contains a quick guide how to get the M&C system set up.

## Installation / cabling

when installing the M&C system hardware, you are advised to do the steps in the following order:

1. Mount the M&C computer into the rack.
2. If applicable, mount the serial interface connector panels at the rear side of the rack and connect them to the M&C computer.
3. Connect monitor, keyboard and mouse.
4. Connect the network, if applicable.
5. Connect the serial interfaces to the devices
6. Finally connect the main power.

### How to connect to the M&C system

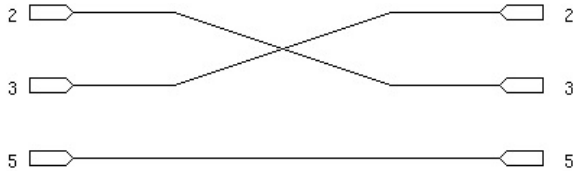
To access the M&C system's Linux operating system, there are basically three methods:

#### 1. **Connect a CRT monitor and a keyboard**

This is the preferred method, because you can not only access the running Linux operating system but also the BIOS configuration screen and some MS-DOS based configuration programs as well. It is recommended to use a CRT monitor rather than a LCD panel as some LCD panels have been reported to refuse syncing to the M&C's screen resolution.**NEW**With the new M&C such problems with LCD panels are not known.

## 2. Connect a terminal to the ttyS1 serial interface

The M&C accepts a VT100 type terminal (or a PC running a terminal emulation program) at the serial interface 'ttyS1' (see the diagram at the end of this chapter). You need a special cable for this case, wired as shown in the diagram below.



The cable, with 9-pin sub-D socket connectors at both sides, connects the pins 2, 3 and 5 with pin 2 and 3 crossed. All other pins are not connected. This is important to avoid any interference with the battery power supply function which uses the other lines of this interface.

The terminal / PC must be set to 9600 baud, 8 data bits, no parity. Hardware flow control must be switched off. When typing **ENTER** at the terminal, you should get a login prompt.

## 3. Connect the M&C to the LAN and use telnet to login

The M&C system accepts telnet logins at the network interface. If you know the actual setup configuration of the M&C's Ethernet interface (specially it's IP address), you may configure a computer to see the M&C in it's address space and connect this computer via Ethernet to the M&C. Telnet is not preferred for the new M&C's.

The M&C by default is configured to the address 192.168.2.222.

## **NEW** 4. Connect the M&C to the LAN and use SSH to login

Use the Secure Shell (ssh) to connect to the M&C via LAN. The connection is encrypted and is much more secure as the plaintext protocol from Telnet.

The M&C by default is configured to the address 192.168.2.222.

### Login procedure

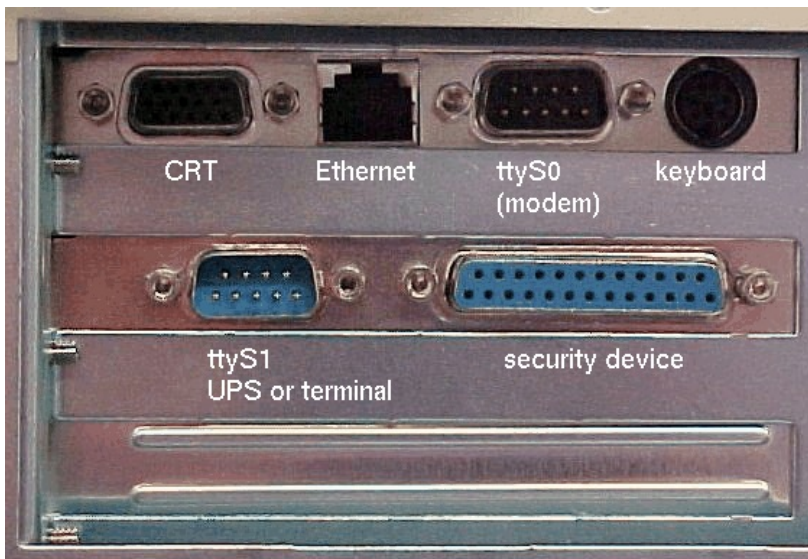
Regardless of physical method of connecting to the M&C you chose, you have to login at the Linux operating system before you can modify the M&C setup configuration. The common login procedure is two step:

First you have to login as user 'mnc' (password 'mnc'). When you are logged on as 'mnc', issue the command 'su' which gives you root / administrator privileges on this computer. When the system asks for the password, enter 'root'.

**NEW** The username and password of new M&C's differs from the old version. Use user 'satnms' and password 'satnms' to login. The root password remains the same ('root').

### M&C connectors

The picture below, showing a part of the M&C's rear panel, denominates the connectors of the M&C core component for your orientation.



**M&C Connectors and Serial Card positions**



Remember to connect the security device coming with the M&C to the 25 pin connector. The M&C will not work without this!

## Serial interface configuration

The M&C comes with a set of serial interfaces ready installed and configured. If you want to change this interface configuration for some reason, you have to do three steps for each card to install.

1. Prepare the card for the installation. Each card needs a certain address and interrupt setting that the M&C system can access it. Some card types are configured with jumpers or DIP switches, other with a special software.
2. Install the interface card in the M&C computer.
3. Tell the M&C system that the card is installed.

Chapter '[Serial interface board reference](#)' explains, which card types can be used with the M&C system and how to configure cards and software to work together.

## Network configuration

The M&C computer comes with it's IP address set to 192.168.2.222. To change this address to your needs, two steps are to be done. These steps are valid for the new and the old version of M&C systems, but for the new version you can use the [NEW setup program](#) instead.

### 1. Change the /etc/network/interfaces file

The IP address of the computer's Ethernet interface is defined in the file /etc/network/interfaces. You need root privileges to change this definition. Below there is an example for this file:



```
# /etc/network/interfaces -- configuration file for ifup(8), ifdown(8)

# The loopback interface
auto lo
iface lo inet loopback

# The first network card - this entry was created during the Debian installation
# (network, broadcast and gateway are optional)
auto eth0
iface eth0 inet static
    address 192.168.2.222
    netmask 255.255.255.0
    network 192.168.2.0
    broadcast 192.168.2.255
    gateway 192.168.2.1
```

To change the computer's network address, login as 'root', and edit the file `/etc/network/interfaces`. The lines you need to change are below the `iface eth0 inet static` line. The 'gateway' is the default gateway were packets are routed to which do not match another rule:

- If there is no router in the network at all, remove this line.
- If the router which is used for remote assistance by SatService GmbH is the only router in the LAN, specify it's address here.
- The there are multiple routers in the network, specify the address of that one which shall act as 'default', e.g. for Internet access.

If you not sure about network and broadcast address remove these lines and the system will calculate these settings.

After you edited the changes, save the file.

## 2. Change the `/etc/hosts` file

The file `/etc/hosts` specifies names for a couple of network addresses. To make services like the SMB (Microsoft Network) server run properly, it is required that the computer's name (which is `satnms`) can be resolved to the address of it's Ethernet interface. Logged on as 'root', edit the file `/etc/hosts` and search for the file defining the 'satnms' IP address. Change the address to the new value.

To activate the changes, save the file and reboot the computer (shell command 'reboot'). The computer will boot up with it's new network settings.

## Client Installation

The **sat-nms** M&C system is able to work as a stand alone system, operated at it's keyboard & screen. In many cases however, you may want to operate the M&C system from another place. Any computer running a Microsoft Windows operating system that has a network connection to the M&C system can be configured to to run the M&C user interface. The following pages describe how to prepare a computer for this purpose.

1. [Ensure that the network connection to the M&C system works.](#)
2. [Install the Java Runtime Environment on the client computer.](#)
3. [Install the M&C client program on the client computer.](#)

To do the installation, you need the following prerequisites:

1. You must know the IP address of the M&C system you want to connect to.
2. You should be familiar with the MS Windows network setup procedures unless the network setup of your computer matches by default.
3. You need an Internet access in order to download the Java Runtime Environment from Sun

Microsystems Inc. (If you cannot download the JRE, you may request a free copy on CD from SatService GmbH).

## Network link

To control the M&C system from another computer, you need a working TCP/IP network connection to this machine. Generally there are three basic scenarios for this:

- The client computer directly connects via Ethernet to the M&C system
- The client computer connects to one Ethernet, the M&C system to another one. Both Ethernets are coupled by some sort of router.
- The client computer connects via modem or ISDN as a RAS client to the network, the M&C system is part of.

Beside this, the network setup suitable for your computer depends of the actual settings you need to connect to the other services you are commonly using. Hence, there is no universally valid rule how to setup the network options for the client computer.

Typing 'ping aaa.bbb.ccc.ddd' (where aaa.bbb.ccc.ddd is the IP address of the M&C computer) at a command prompt should list 4 echoes from the M&C system, then the network link to the M&C system works. If you are working with a dial up connection, you must start this connection before.

## Java runtime environment installation

You need the Java Runtime Environment (JRE), Version 1.4 or newer to be installed on the client computer in order to run the M&C client software. You get the JRE from Sun / JavaSoft at '<http://java.sun.com/>'.

Download the JRE installation file from the URL shown above and install the JRE by double clicking to the icon of the downloaded file. When asked by the install program include the files for internationalization ('i18n'), even if you intend to use the English language settings only.

After the installation has finished, you may delete the installation file you downloaded unless you want to save it for later use.

## Installing the program

The M&C client program consists of a single file called 'satnms.jar'. There are two options where the satnms.jar file is located:

1. local copy on you client computer
2. remote copy on the public network share on M&C system

### local copy

You have to copy this file to the client computer and finally to create a link to start the program. The procedure is as follows:

1. Use the Windows-Explorer to create a new directory called 'c:\satnms'. (You can use another name and location for the directory as well)
2. If you are using a dial up connection to the M&C system, start this connection.
3. Connect a new network drive (e.g. 's:') to the share '\\aaa.bbb.ccc.ddd\public', where aaa.bbb.ccc.ddd is to be replaced by the IP address of the M&C system.
4. Browse the drive 's:', it contains a file 'satnms.jar'.
5. Copy the file 'satnms.jar' to the directory 'c:\satnms' (with a dial up connection this may take some seconds, satnms.jar is almost 1 MByte).

### remote copy

You have to map a network drive to the public share of the M&C system and finally to create a link to start the program. The procedure is as follows:

1. Connect a new network drive (e.g. 's:') to the share '\\aaa.bbb.ccc.ddd\public', where aaa.bbb.ccc.ddd is to be replaced by the IP address of the M&C system and select that the mapping should be established on every reboot.
2. Browse the drive 's:' to check if the file 'satnms.jar' exists.

## create link

You have now the 'satnms.jar' file installed locally on you computer or you have a mapped network drive that points to the remote directory with the 'satnms.jar' file. Finally you have to create a link in the start menu or on the desktop which starts the program for you. The steps below describe how to create a link on the computer's desktop.

1. Click the desktop with the right mouse button, choose 'New link'.
2. Enter the following properties for this link:

Link name:	<b>M&amp;C Client Program</b> You may replace this name by any other you like.
Command:	<b>javaw -cp satnms.jar satnms.gui.MCFrame aaa.bbb.ccc.ddd</b> Replace aaa.bbb.ccc.ddd by the M&C system's IP address. Pay attention to the case of the letters in satnms.gui.MCFrame, the command will not work if you use upper/lower case letters other than shown here.
Working Directory:	<b>c:\satnms or s:\</b> The command will find the satnms.jar file only if you fill in the location of this file here.

3. Choose an icon for the link (The Windows 98 standard icons contain a satellite dish you may want to use).

Additional command line switches are described in chapter [Command Line Arguments](#)

Now the installation of the program is finished. You should be able to start the M&C client program by double clicking to the link you installed. If not, try the [trouble shooting](#) steps in the next chapter.

## Command Line Arguments

You can add additional command line arguments to the command described in the previous chapter.

<i>option</i>	<i>description</i>
-u [username]	use given username for automatical login
-p [password]	use given password for automatical login
-s [screen]	start with defined user screen instead of default screen
-V	enable verbose mode which prints all events to stdout
-v	skip version check at startup
-n 1	activates 'new fault' signalling
-n 2	activates 'new fault' signalling and enable beeper if an new fault is arriving

## Example

```
javaw -cp satnms.jar satnms.gui.MCFrame -u admin -p secret -v 192.168.1.1
```

This starts a client for the M&C system at IP address 192.168.1.1 with automatic login as admin with password secret and without version checking.

## Troubleshooting

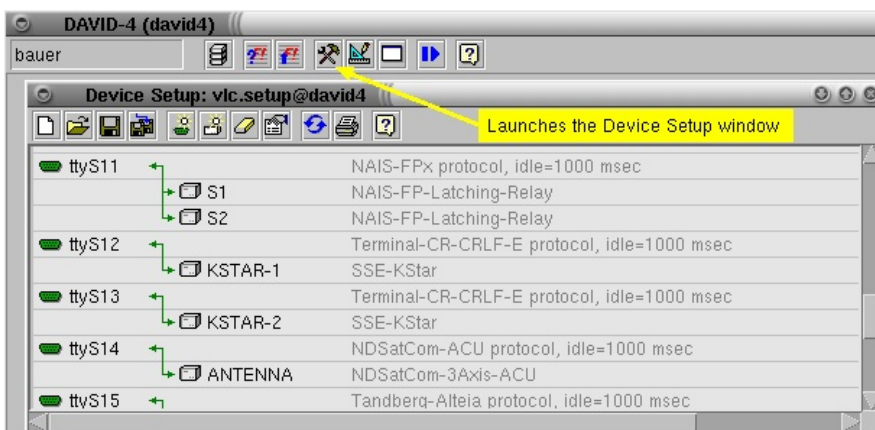
If the client installation does not work as described, here a summary how to investigate what went wrong:

1. Open a MS-DOS shell window.
2. Type '**java** **ENTER**'. You should see a description of options the java program accepts. If you get an error message instead, you did not install the JRE program properly.
3. Type '**c:** **ENTER**' for local or '**s:** **ENTER**' for remote installation and if you get an error message you did not map the network drive properly.
4. For local installation type '**cd \satnms** **ENTER**'. If you get an error message here, you did not create the c:\satnms directory.
5. Type '**ping aaa.bbb.ccc.ddd**', where aaa.bbb.ccc.ddd is the IP address of the M&C system. You should see four echoes from the server, one per second. If the ping command claims something like 'timed out', your network connection to the M&C system is not properly set up.
6. Finally you can try to start the client program from the command line. Type in the following:  
'**java -cp satnms.jar satnms.gui.MCFrame aaa.bbb.ccc.ddd** **ENTER**'  
Again, replace aaa.bbb.ccc.ddd by the IP address of the M&C system.

## Configuration / Setup

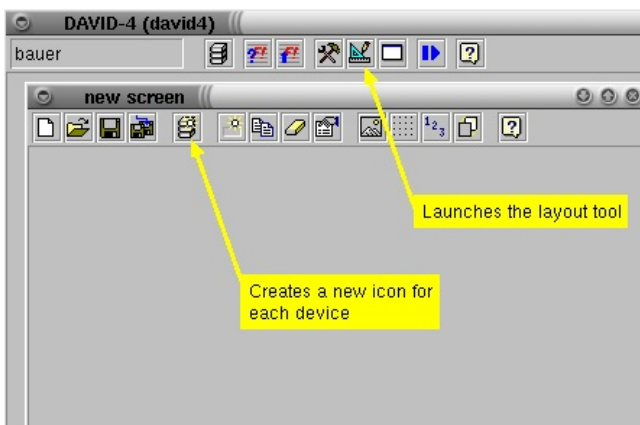
To become useful, a newly installed M&C system must be configured for the equipment it shall control. Principally there are three steps to do:

### 1. Tell to M&C system which device is connected to which interface



The M&C user interface provides an own window for this. Above, an example of this window is shown. You find a detailed description of this window and its usage in the online help / user manual of the M&C system.

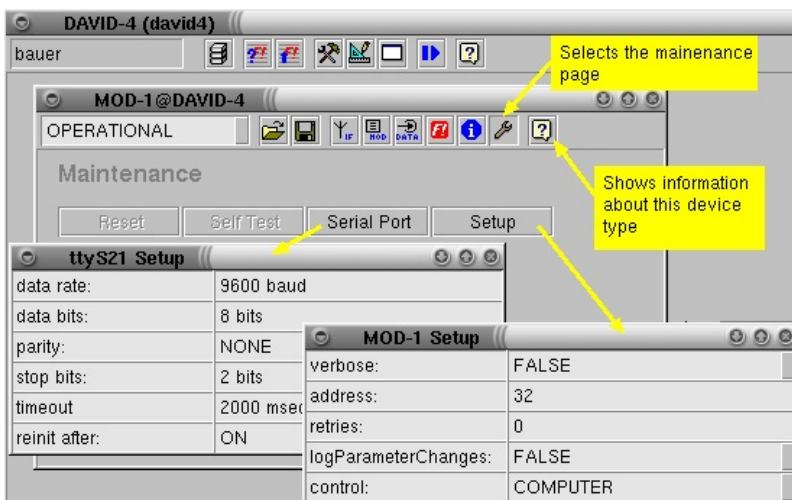
### 2. Create a user interface



The fastest way to create a user interface is to launch the screen layout tool and let the tool create an icon for each device managed by the M&C system. Drag the newly created icons at positions you like (you may enlarge the window by dragging the lower right corner). Save the layout by clicking to the button with single floppy disk icon and close the layout tool.

The layout tool enables you to create much nicer user interface screens than this primitive first one. However, this is a first step and this user interface screen shows the fault state of each device. With a double click to a device icon you open a window which lets out edit all parameters of this device.

### 3. Communication parameter setup



At this stage probably all devices will be shown red colored because the communication between the devices and the M&C system does not work. This is because first some parameters like the line speed or the device address must be configured.

Hence, open the device window for each device, switch to the 'maintenance' page in the device window and inspect the 'Serial' and 'Setup' dialogs. The context sensitive online help gives you advice which values to set for a particular equipment type.

## Setup program

**NEW** The new Version contains a setup program for the basic configuration steps described in the last chapters. With this program you can easily the network and serial interface settings of the M&C system. **NEW** You have to login as root (see [How to connect to the M&C](#)) and then start the program by enter 'setup' **ENTER** at the command prompt. The dialog based program ask for the parameters, writes them to the **sat-nms** configuration file and finally applies the setting to the system and the appropriate configuration files of the Linux operating system.

See [The file /etc/satnms.rc](#) for a complete list and the complete description of all parameters.

The file '/etc/satnms.rc'

Below the file '/etc/satnms.rc' with the factory default settings is listed. Comments in the file describe the meaning and valid range of each setting at great length. To change some of the settings, connect to the M&C and login as described in [How to connect to the M&C system](#) and then start the [setup program](#).

You can also open this file in an editor (e.g. vi or mcedit) and Change the parameters at your needs and save the file. To apply the settings to the Linux operation system call 'apply-setup' or set the parameter 'SATNMS\_CONF\_APPLY' to 'reboot' and reboot the system. This cause the system to apply all settings from /etc/satnms.rc before shutdown.

#

```
# sat-nms configuration file
#
# After changing this file run 'apply-setup' to execute the
# changes or set sat-nms_CONF_APPLY="reboot" and reboot the system
#
# For easy configuration use the 'setup' program
#

#####
#
# Basic settings
#
#####

# working mode
#
SATNMS_TYPE="mnc"

# vlc/mnc hostname # A unique identification number for the VLC/MNC in the
# network. # Must be in the range 1 .. 1600 decimal with a leading vlc # e.g.
# "vlc0002" for VLC's or any valid hostname for MNC systems
#
SATNMS_HOSTNAME="mnc001"

#####
#
# Network settings
#
#####

# ip-address and netmask
#
SATNMS_IP_ADDRESS="192.168.2.222"
SATNMS_IP_NETMASK="255.255.255.0"

# The default gateway, set to non if not needed
#
SATNMS_IP_GATEWAY="192.168.2.254"

# Address of the dns name server, set to non if not needed
#
SATNMS_IP_DNSSERVER="192.168.2.253"

#####
#
# Serial interface settings
#
#####

# Sets up the serial ports (passive cards and Control Rocketport cards)
# in the computer. Replaces the original Debian setserial script.
#
# Basically three types of cards are supported:
# 4-port      MOXA Smartio/Industrio 4 port card
# 8-port      MOXA Smartio/Industrio 8 port card
# rocketport  Control Rocketport (8 port) card
```

```
#
# The variable SATNMS_SERIAL selects one of 15 combinations of cards. The
# software documentation shows the address/irq settings vor each board in
# each particular configuration
#
# 0:    no cards
# 1:    4-port
# 2:    4-port + 4-port
# 3:    8-port
# 4:    8-port + 4-port
# 5:    8-port + 4-port + 4-port
# 6:    8-port + 8-port
# 7:    8-port + 8-port + 4-port
# 8:    8-port + 8-port + 8-port
# 9:    ROCKET
# 10:   ROCKET + 4-port
# 11:   ROCKET + 4-port + 4-port
# 12:   ROCKET + ROCKET
# 13:   ROCKET + ROCKET + 4-port
# 14:   ROCKET + ROCKET + ROCKET
#
SATNMS_SERIAL=2

# MOXA Intellio C320/Turbo cards 8 ... 96 ports
# Select the number of ports (multiples of 8) which are accessible
# through C320/Turbo boards. Say 0 if there is no C320 card in the
# MNC
#
# Either one board (8, 16, 24 or 32 ports), two boards (40, 48,
# 56 or 64 ports) or three boards (72, 80, 88 or 96 ports) may be
# installed. One C320 board may be combined with one or two internal
# boards, Two C320 boards may be combined with one internal serial board.
#
SATNMS_INTELLIO=0

# Digi EtherLite TCP/IP terminal server
#
# If you say yes here, the Digi els driver is launched on system
# startup. You must have a running Ethernet interface for this,
# the file /etc/els.conf must be adapted to the unit's configuration
# you want to access
#
SATNMS_ETHERLITE=no

#####
#
## Date and Time
#
#####

# Name of NTP Server for clock synchronization.
# Set to none to disable clock sync.
#
SATNMS_TIME_NTP="192.168.2.1"

# Name of Daytime Server for clock synchronization
# Set to none to disable clock sync.
#
SATNMS_TIME_DAYTIME="none"
```

```
#####
#
# Backup settings
#
#####

# Setting for the automatic backup of sat-nms data
#

# yes to enable automatic backup to the zip drive
SATNMS_BACKUP_ZIP="yes"

# yes to enable automatic backup from sat-nms ACU-ODM
SATNMS_BACKUP_ODM="yes"

# yes to enable automatic backup from sat-nms LBRX
SATNMS_BACKUP_LBRX="yes"

# IP address or hostname of the ftp server for backups
# Set to none to disable ftp backups
#
SATNMS_BACKUP_FTP="192.168.2.33"

# IP address or hostname of the ssh server for backups
# Set to none to disable scp backups
SATNMS_BACKUP_SCP="192.168.2.33"

# username for ftp and scp
SATNMS_BACKUP_USER="mnc"

# password for ftp, use dsa-public keys in /root/.ssh/ for scp
SATNMS_BACKUP_PASS="mnc"


#####
#
# Modem settings
#
#####

# Set this to "yes" if you have a modem/terminal-adaptor connected
# to /dev/ttyS0 and you want to use a PSTN line for the VLC-NMS
# communication. Default is "no"
#
SATNMS_MODEM_USE="no"

# Baud rate, the tty rate to be used to the modem
#
SATNMS_MODEM_BAUD="38400"

# Init string, is sent by mgetty to the modem every minute to
# initialize the modem
#
SATNMS_MODEM_INIT="AT&F"


#####
#
# Setup program settings
#
```



#####

```
# apply new configuration to system files manual or on reboot
#
SATNMS_CONF_APPLY="manual"
```

## System Administration

The M&C computer in fact is a Linux based server, running the M&C process and some other programs in background. The M&C Linux has been tuned to require as little as possible administration effort. Almost everything you want to do with the M&C system you do at the M&C user interface.

Anyhow, some administrative tasks should be done at the M&C computer. They are:

- [Check your mailbox.](#)

The Linux based M&C server provides a local e-mail box where you find messages from the background jobs the computer does. If a background process detects some failure, it sends a mail to you.

- [Maintain the M&C user list.](#)

The M&C software uses it's own password protection system. The user / password list for this is contained in a file you have to edit.

- [Backup your data.](#)

Backed up data is not lost if the computer hardware breaks!

### Checking your mail

The Linux operating system of M&C system does a lot of jobs in the background. You don't need to care about this. If one of these background jobs fails, it sends a mail to the 'mnc' user. If, for example, you have configured the M&C computer to synchronize it's clock to a NTP time server in the net, this is done by such a background job. If the clock sync was not successful because the time server was unreachable, you get informed about this with a mail.



If there is a message for you, the mailbox icon left beside the clock contains a letter. Click to the mailbox symbol and a simple e-mail program starts. If you are familiar with another mail program at your desktop computer, you quickly will be oriented with this program.

If there is some unread mail in the mailbox when you connect with a telnet client to the M&C system, you get a short note about new or unread mail when you log in. It is principally possible to read the mail during the telnet session. However, the text based mail reader (the program is called 'mail') is quite difficult to use. It is recommended to read the system administrator's mail in front of the M&C computer.

### M&C password list

The M&C system uses it's own password protection system to prevent the system from accidentally or even deliberately being misused. The fundamental idea of the password protection system is that each operator has to login with a user name and password to the M&C system to be allowed to change parameters. A 'privilege level' assigned to each operator defines if he may change some sensitive settings.

#### Privilege levels

There are two standard privilege levels used by the M&C software:

100	The privilege level 100 is used for normal operators. With this level an operator is permitted to change all equipment settings but not to modify any configuration parameters or to save and overwrite presets.
110	The privilege level 110 is used for advanced operators. With this level an operator is also allowed to

	save, delete and overwrite presets.
150	The privilege level 150 gives complete access to all settings in the software. This is the privilege level of the M&C system administrator.

The privilege level regulates the *write* permission of the operator to software parameters or device settings. Read-only access is permitted to every operator, even if he is not logged in.

With a customer designed (a.k.a. 'task oriented') user interface additional privilege levels may defined. In such an application specific setup it is possible e.g. to give a group of operators the permission to work on the receive equipment only, while other operators may change the settings of the transmit equipment, too.

## Password file

The list of users together with the password and privilege levels is stored in the file '.users' located in the home directory of the M&C application. Please note the leading dot in the file name, it makes the file hidden in a directory listing. The M&C system administrator logged in as (Linux) user 'mnc' is permitted to modify this file. M&C operators cannot change their passwords, only the M&C system administrator can do this by modifying the '.users' file.

**NEW** Use the user 'satnms' instead of 'mnc'.

The M&C system comes with a default user called 'anonymous' in the '.users' file. The entry demonstrates the format of the password file:

```
# sat-nms password file
# name; password; level

anonymous; anonymous; 150
```

**NEW** Another default user for new systems is 'satnms' with password 'satnms' and a privilege level of 150

A user entry of the password file consists of three fields, separated by semicolons. The first field defines the login name, the second field the password and the last field defines the privilege level for this user. Empty lines and lines beginning with a dash ('#') are ignored.

## Data Backup & Restore

The M&C system is prepared to do a backup of all individual data stored on the M&C computer either on a regular basis or at an operator's request. For this purpose, the M&C computer is equipped with a ZIP disk drive.

**NEW** New systems offers some advanced backup features described in the [next chapter](#).

### Manual backup

To do a backup manually, insert a ZIP disk into the drive and select *System Administration -> Backup to ZIP* from the start menu. The M&C system does the backup and ejects the ZIP disk when the backup has completed. The backup process writes one file called 'backup.tgz' to the disk, each subsequent backup overwrites the old file on the disk.

Doing the backup manually is the recommended method if you primarily want to backup your configuration files. They need to be saved only after they have been changed. Once the M&C system has been set up, the configuration probably will not be changed for a longer time. You should do a backup in the following cases:

- If you changed the configuration of the M&C setup. Please have in mind that even small changes like a modified interface timeout or an updated calibration for a transmit power control loop must be saved.
- If something with the Linux configuration, e.g. the networking parameters have been modified.

- It is also a good idea, to back up the configuration before you start to change the M&C system configuration. If the M&C system does not work as expected after the change, you have the chance to restore the state before the change.

If you do manual backups, you should use at least two disks. Use the disks on a rotating basis, you will be able to restore an older state if you backed up the M&C system with some data already corrupted.

## Automatic backup

If you must rely on the event log data collected by the M&C system, e.g. if you derive some billing data from the times with a carrier on air, a daily backup is essential. You may configure the M&C system to backup your data every day. Use the [NEW setup program](#) for new systems or perform the following steps for old systems:

1. Open an XTerm window.
2. Enter 'su' and give the root password ('root') when requested.
3. Open the file `/etc/crontab` in the editor by typing 'vi /etc/crontab'.

About 15 lines below the top of the file you find an entry looking like this:

```
# uncomment this entry to enable the automatic daily backup
#
#33 5 * * 6 root /usr/local/bin/backup-to-floppy
```

Remove the dash ('#') in front of the '33', this activates the background job. The backup will be done every morning at 5:33 am (UTC, if the computer's clock is running at UTC). Save the file and leave the editor (`ESC:X`).

[NEW](#) For new system you can configure these settings manually by setting `SATNMS_BACKUP_ZIP="yes"` in the file `/etc/satnms.rc`. You do not need the edit `/etc/crontab` because its already configured to 3:30 in the morning.

Now, at every evening, insert a ZIP disk to the drive. The M&C system automatically will do the backup in the following morning. By using 7 disks in a rotating way, you get a one week backup.

## Data restore

Restoring the data stored with the backup facility is as simple as doing the manual backup. Perform the following steps:

1. Stop the M&C server process. Select *System Administration* --> *Stop M&C service* from the start menu for this.
2. Insert the ZIP disk with the backup data to restore.
3. Select *System Administration* --> *Restore from ZIP* from the start menu to read the data from the ZIP disk. The M&C system ejects the ZIP disk after it has read the data.
4. Re-boot the M&C system by selecting *System Administration* --> *Reboot computer*.

The M&C system shuts down and re-boots.

## Advanced backup

{ b Automatic Backup }

[NEW](#) With the new MNC system you are able to make backups not only to the local ZIP-drive but also to:

- FTP server (File Transfer Protocol)
- SSH server via SCP (Secure copy)

To enable this backups just use the [setup program](#) or set `SATNMS_BACKUP_FTP /`

SATNMS\_BACKUP\_SCP to the ip-address or hostname of the backup server computer.

For FTP backup you have to provide a username and password for the FTP server. Backups via SSH/SCP requires an username and a trusted public key from the MNC system on your SSH server. Consult the manuals of your SSH server how to configure private/public-key authentication. On the MNC system you can create new keys with `ssh-keygen`. To configure the username (FTP and SCP) and password (FTP) use the [setup program](#) or set `SATNMS_BACKUP_USER` and `SATNMS_BACKUP_PASS` in `/etc/satnms.rc`.

## Data restore

 Perform the following steps to restore a backup from a remote server

1. Stop the M&C server process. Select *System Administration* --> *Stop M&C service* from the start menu.
2. Open a X-Term window / shell and login as root .
3. FTP: Run `/usr/local/bin/restore-from-ftp [date]`.
4. SSH/SCP: Run `/usr/local/bin/restore-from-scp [date]`.
5. [date] is the date of the backup in the following format: `yyyymmdd` e.g. 20050123 for 23.January 2005
6. Re-boot the M&C system by selecting *System Administration* --> *Reboot computer*. The M&C system shuts down and re-boots with the settings from the backup.

## Crash Recovery

The M&C system comes with a system recovery CD which enables you to re-install the M&C software as well as the underlying Linux operating system on the M&C computer.

Before you start with the recovery procedure below, ensure that the hardware fault which has broken the M&C system is fixed. Then the following steps have to be done:

### A. Boot the recovery CD

1. Switch on the M&C computer.
2. Before the computer tries to boot, insert the recovery CD
3. When the screen shows 'LILO boot:', hit **ENTER**.
4. The Linux rescue system booting now automatically logs you on as 'root'. If you are using a non-American keyboard, you might use the 'kmap' command to load the appropriate keyboard driver (example `kmap de`).

### B. Partition the hard disk

The next step is to partition the hard disk. Use the 'fdisk' command to delete all existing partitions on the hard disk, then create the new partitions.

1. Type '**fdisk/dev/hda** **ENTER**' to start 'fdisk'.
2. Type '**p** **ENTER**' to show the partition table of the disk. If there are already any partitions of the disk, delete them by typing '**d** **ENTER**' followed by the partition number. You should start with the higher numbers, if there is more than one partition.
3. Create the first partition. Follow transcript below. Operator entries are printed bold.

```
Command (m for help): n ENTER
Command action
e extended
p primary partition (1-4)
p ENTER
Partition number (1-4): 1 ENTER
First cylinder (1-1245, default 1): ENTER
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-1245, default 1245):
+2048M ENTER
```

4. Using the same procedure, create the second partition.

```
Command (m for help): n ENTER
Command action
e extended
p primary partition (1-4)
p ENTER
Partition number (1-4): 2 ENTER
First cylinder (263-1245, default 263): ENTER
Using default value 263
Last cylinder or +size or +sizeM or +sizeK (264-1245, default
1245): +128M ENTER
```

5. Make the second partition a 'swap' partition.

```
Command (m for help): t ENTER
Partition number (1-4): 2 ENTER
Type: 82 ENTER
```

6. Make the first partition bootable.

```
Command (m for help): a ENTER
Partition number (1-4): 1 ENTER
```

7. Now check the partition table typing '**p** **ENTER**'. This should look like this (Start and end cylinders may be different, depending on the geometry of your hard disk).

```
Disk /dev/hda: 255 heads, 63 sectors, 1245 cylinders
Units = cylinders of 16065 * 512 bytes
```

Device	Boot	Start	End	Blocks	Id	System
/dev/hda1	*	1	262	2104483+	83	Linux
/dev/hda2		263	279	136552+	82	Linux swap

8. Now exit and save the partition table. Type **w** **ENTER**.

## C. Format the partitions

Now you have to create the Linux file systems on the disk partitions. Type the following:

```
mke2fs /dev/hda1 ENTER
mkswap /dev/hda2 ENTER
```

## D. Copy the Linux system from the CD-ROM to the disk

Now install the Linux system on the M&C computer. The sequence of commands is:

```
umask 000 ENTER
mount /dev/hdc /cdrom ENTER
mount /dev/hda1 /mnt ENTER
cd /mnt ENTER
tar xzvpf /cdrom/linux.tgz ENTER
cd / ENTER
umount /mnt ENTER
```

Installing this may take some minutes, depending on the speed of the computer. By using the 'v' flag with 'tar', you see the name of each file which is going to be installed, you see that the computer is working, not frozen.

## E. Boot the installed Linux the first time

Now you have to boot the installed Linux system the very first time. It is still not yet able to boot by itself, so leave the CD in the drive.

1. Type '**reboot** **ENTER**'.
2. After the computer booted again, when it prompts 'LILO boot:', enter '**linux root=/dev/hda1** **ENTER**'. Be aware, that the computer at this early stage expects an American keyboard. To type the '/' use the key next to the right shift key. '=' you will find left beside the backspace key in the top row of the main keyboard block.
3. Log on as 'root' (password 'root').
4. Type '**lilo** **ENTER**'.

The new Linux installation is now bootable, but the M&C application is not able to run as up to now there are no files installed which configure the software for your application.

## F. Restore the customer specific data

Finally, remove the rescue CD from the drive and type '**reboot** **ENTER**'. The M&C system now shuts down and re-boots with the X-Windows graphical login screen.

Login as user 'mnc' (password 'mnc') and restore the application data from the recent backup ZIP disk. Use the procedure described at the last paragraph of the chapter '[Data Backup & Restore](#)'.



## Miscellaneous

This section contains some topics which are not covered by the 'Installation' and 'Administration' sections of this manual. They are:

- [Integrating the M&C system into a NMS](#)
- [Maintaining a spare M&C computer](#)
- [Clock synchronisation](#)

## Integrating the M&C system into a NMS

A M&C system may be controlled by a superordinate **sat-nms** network management software. From this software's point of view, the M&C system looks like a VLC, a VSAT local controller. As there are yet some small differences, you should consider the following:

- The computer's name (hostname) of a M&C system usually is 'satnms', as long as you didn't change this. To the NMS software, a VLC must appear as 'vlc####' where '####' is the ID of the VLC. You achieve this by modifying the file 'runmnc' in the application's home directory. The line containing the 'jre' call in this file must be modified to contain a '-Dhostname=...' parameter as shown in the example below.

```
jre -cp satnms.jar -Dhostname=vlc0002 satnms.vlc.Server
```

NEW To change the hostname of the M&C system simply use the [setup program](#) or edit the **sat-nms** configuration file [/etc/satnms.rc](#).

- A M&C system provides its local event log data base. If used in a NMS, the event log is located at the NMS rather than at the M&C system. You have to change this at the device window of the 'SYSTEM' device at the user interface.
- When operated as a M&C system the file '/home/mnc/screens/default' at the M&C computer contains the definition of the primary user interface screen. With a NMS, this is the file '/home/nms/vscreens/vlc####' located at the NMS computer. A convenient method to change this is copying the file via FTP. If the M&C system uses more than one user interface screen, the alternate screens must be copied to the NMS computer, too. NEW the files are located in '/home/satnms/screens/' on the M&C system.
- For detailed information about connecting a M&C system / VLC to the NMS please refer to the chapter 'Network configuration' in the 'VLC Installation Manual'

## Maintaining a spare M&C computer

In many applications, M&C systems are in use 24 hours a day and 7 days in the week. Having a second M&C computer as backup shortens the outage time in case of a hardware failure to less than 15 minutes. The following paragraphs guide how to maintain a backup M&C computer.

First one **very important** advice: Backup the M&C application data regularly. Backing up the M&C system is easy (see chapter '[Data Backup & Restore](#)' in this manual) and can be done by every operator. Without a usable data backup, the backup hardware is quite worthless.

To exchange the M&C computer hardware, perform the steps described below:

1. Shut down the faulty M&C system, switch the computer off.
2. Remove all connectors from the M&C computer.
3. Replace the computer by the spare unit.
4. Connect only monitor, keyboard, mouse and mains power to the computer.
5. Switch on the computer.
6. When the M&C system is up, login as user 'mnc'. Restore a recent data backup from ZIP disk as

described in chapter '[Data Backup & Restore](#)'.

7. Shut down the computer, switch it off after it is down.
8. Connect the remaining cables to the M&C computer.
9. Switch the M&C computer on again. After it booted up the M&C system should be operable again.

It is important to do the first boot of the spare computer without having the serial interface to the devices connected. An outdated configuration of the M&C software on the spare computer could mess up your equipment.

With a spare M&C computer on stock, it is a good idea to swap the computers in a regular basis, e.g. once every month. First, this is a check if the spare computer still works. Secondly, operator become trained to do the swap. In case of emergency the M&C system will be faster up again. Finally swapping the computers prorates the power-on hours equally among the computers.

It is also possible to have both computer running and automatically transfer the configuration from the active to the spare M&C system. Ask SatService GmbH for a special solution which meets your requirements.

## Clock synchronisation

The M&C system uses the time and date from its internal clock to mark each message in the event log with a time stamp. To make the event log information comparable with statements from other sources, an accurate clock setting is essential. As PC clocks tend to be not very accurate, the M&C clock should be checked at least once a week. Principally there are two methods to correct the clock:

1. [Set the clock manually.](#)
2. [Read the clock from another computer.](#)

Without doubt, the second method is the more comfortable one. It however requires a NTP (Network Time Protocol) or Daytime server providing the accurate time visible for the M&C system in the network.

### Manually setting the clock

The M&C system runs a daemon called 'clktimed' which keeps the Linux system clock in tune with the hardware clock chip built in the computer. Setting the clock means setting time and date of the clock chip. 'clktimed' then will tune the system clock accordingly. Depending of the amount of time, the clock chip was set, it takes a few hours or several days until the system clock is in sync with the clock chip.

To set the M&C system's clock, you need root privileges. The procedure is as follows:

1. Open an XTerm window
2. Become 'root', type in '**su** **ENTER**' and the root password.
3. Type: '**hwclock --set --date "YYYY-MM-DD HH:MM:SS" **ENTER****'
4. Close the window.

It is recommended to set the NMS clock to UTC rather than to local time.

### Syncing the clock with a NTP server

The M&C system has been prepared to sync its clock automatically once a week to a NTP reference in the network. To activate this option, perform the following steps but for the new version [NEW](#) use the [setup program](#) instead.

1. Open an XTerm window
2. Become 'root', type in '**su** **ENTER**' and the root password.

3. Type '**vi /usr/local/bin/set-clock-from-network** **ENTER**'

One of the first lines of the file shows :

```
NTP_SERVER=""
```

4. Insert the IP address of the NTP server to poll between the double quotes.
5. Save the file and close the window.

**NEW** For new systems use the following steps if you don't want to use the setup program:

1. If you want to sync the clock to another machine using DAYTIME, set SATNMS\_TIME\_DAYTIME in /etc/satnms.rc to IP address or host name of the machine to sync with.
2. If you want to sync the clock to a NTP time server, set SATNMS\_TIME\_NTP to the IP address or host name of the machine to sync.
3. Run the program '**usr/local/bin/set-clock-from-network**

The M&C system now will set it's clock chip every day at 12:00 from this NTP server. If this fails, a mail is sent to the operator. If you want to sync the clock at another time or in other intervals, modify the file /etc/crontab to your needs.

Instead of NTP, the M&C system also is capable to use the traditional Unix DAYTIME service for syncing the clock. If the M&C system is working in a Linux/Unix network with a computer offering the DAYTIME TCP service, you alternatively may set the DAYTIME\_SERVER definition instead of the NTP\_SERVER.


Please note, that a M&C system which is integrated to a **sat-nms** network management system should not use this method of clock synchronization. With the **sat-nms** NMS software the NMS service provides the master clock for all affiliated VLCs / M&C systems.

## Appendix

- [Serial interface board reference](#)
- [A short introduction to 'vi'](#)


### Serial interface board reference

A M&C system can contain up to three serial IO cards which add RS232 or RS422/485 interfaces to the unit. While principally the M&C system works with any serial IO card which is compatible to Linux, the units are pre-configured to work with a fixed set of card configurations. The following types of cards are supported by the M&C system:

<a href="#">Moxa Smartio/Industrio series</a>	This is a family of 4-port / 8-port passive serial cards which are available with RS232 or RS422/485 interfaces and various types of connectors.
<a href="#">Comtrol Rocketport</a>	The Rocketport is an active 8-port card providing 8 RJ45 connectors directly on the card's back.
<a href="#">Moxa Intellio C320 Turbo</a>	The Intellio C320 is an active card which uses its own processor to manage the data exchange to up to 32 ports for each card. The IO ports are located in rack-mountable modules containing 8 or 16 ports each.
<a href="#">Digi Etherlite Terminal Server</a>	 For large systems an external terminal server may provide a nearly arbitrary number of serial ports. The terminal server is connected to the VLC via Ethernet.

The serial IO cards are not automatically recognized by the M&C system. Each card must be configured to the address/irq settings expected by the software. Then the software must be told which cards are installed.

The card configuration is defined in the configuration files `'/etc/init.d/setserial'` and `'/etc/init.d/intellio'`. Both files contain a variable definition at one for the first lines. The `'SERIAL'` variable defines the Smartio/Industrio or Rocketport boards to be used. The `'INTELLIO'` variable defines the number of IO ports connected to one or more Intellio boards.

 The card configuration is defined in `'/etc/satnms.rc'` and the variable `SATNMS_SERIAL` defines the combination of interface cards. `SATNMS_INTELLIO` defines the number of IO ports connected to one or more Intellio boards. You can use the [setup program](#) to configure these settings.

#### 4 / 8 Port Cards

The following table shows the configurations which can be selected with the parameter `'SERIAL'`. The table uses the abbreviations **4-PORT**, **8-PORT** and **ROCKET** for Moxa Smartio/Industrio series and Rocketport cards respectively.

SERIAL	Card 1	Card 2	Card 3
0	-	-	-
<u>1</u>	<a href="#">4-PORT</a>	-	-
<u>2</u>	<a href="#">4-PORT</a>	<a href="#">4-PORT</a>	-
<u>3</u>	<a href="#">8-PORT</a>	-	-
<u>4</u>	<a href="#">8-PORT</a>	<a href="#">4-PORT</a>	-
<u>5</u>	<a href="#">8-PORT</a>	<a href="#">4-PORT</a>	<a href="#">4-PORT</a>
<u>6</u>	<a href="#">8-PORT</a>	<a href="#">8-PORT</a>	-
<u>7</u>	<a href="#">8-PORT</a>	<a href="#">8-PORT</a>	<a href="#">4-PORT</a>
<u>8</u>	<a href="#">8-PORT</a>	<a href="#">8-PORT</a>	<a href="#">8-PORT</a>

<a href="#">9</a>	<a href="#">ROCKET</a>	-	-
<a href="#">10</a>	<a href="#">ROCKET</a>	<a href="#">4-PORT</a>	-
<a href="#">11</a>	<a href="#">ROCKET</a>	<a href="#">4-PORT</a>	<a href="#">4-PORT</a>
<a href="#">12</a>	<a href="#">ROCKET</a>	<a href="#">ROCKET</a>	-
<a href="#">13</a>	<a href="#">ROCKET</a>	<a href="#">ROCKET</a>	<a href="#">4-PORT</a>
<a href="#">14</a>	<a href="#">ROCKET</a>	<a href="#">ROCKET</a>	<a href="#">ROCKET</a>

The ports provided by these cards are named following a [fixed scheme](#), making it easy to link port names to connector names.

## Moxa Intellio Cards

The **sat-nms** M&C system has the necessary driver software for Moxa Intellio boards pre-installed. The file `/etc/init.d/intellio` controls the activation of the driver at system startup. Ports at Moxa Intellio boards are defined by means of the 'INTELLIO' variable defined in this file. INTELLIO must be set to the total number of serial ports provided by the modules connected to Intellio boards. The M&C system assumes, that the first 32 ports are assigned to board 1, the next 32 ports to board 2 etc. 'INTELLIO=0' tells the M&C system that there is no Intellio board in the system. Intellio boards may be combined with the 4/8 port boards discussed above, however, the total number of serial IO cards in the M&C system must not exceed 3. Intellio cards are configured by [jumpers/DIP switches](#).

The port names generated for Intellio cards follow a [similar scheme](#) as the passive cards do.

**NEW** The variable name was changed to SATNMS\_INTELLIO.

## Digi Etherlite Terminal Server

**NEW** The MNC also supports the Digi Etherlite terminal server series. Set the variable SATNMS\_ETHERLITE in the file `/etc/satnms.rc` to 'yes' if you have connected one or more terminals servers to the VLC's Ethernet port.

The terminal servers have to be set to fixed IP addresses within the subnet covered by the subnet of the VLC's Ethernet port. To tell the serial port driver which Etherlite units are connected, you must edit the file `/etc/els.conf`. For details, refer to the Digi user manual and the information available at the Digi web site concerning the Etherlite Linux driver.

## Port Naming

The M&C system uses a fixed scheme to name it's serial ports. This scheme makes it easy to match port connections and the corresponding port names in the software:

4/8 port cards:	<p>The port names are built as 'ttySik', where 'i' is the number of the board (1..3) and 'k' is the number of the port in the board (1..8). The latter port number matches that one printed on the boards bracket or on the individual connector.</p> <p>Example: 'ttyS23' designates the third port on the second board.</p>
Intellio cards:	<p>The port names are built as 'ttyikl', where 'i' is the number of the board (A..C), 'k' is the number of the external IO module (1..4) and 'l' is the individual port number at this module(1..8).</p> <p>Please note, that 16 port modules are treated by the driver like 2 8-port modules in one housing. They occupy 2 module addresses where the first contains the ports 1..8, the second one the ports 8..16.</p> <p>Example: 'ttyA18' designates the 8th port at the first module connected to the first Intellio</p>

	board.
Etherlite ports:	The Etherlite serial port driver automatically assigns names to the ports it manages. The names are 'ttyN???' where the question marks are replaced by a number which identifies the individual port. Please refer to the Digi software documentation for the numbering scheme used.

## M&C Serial IO Card Configuration 1

No. of boards:	1
No. of ports:	4
Board 1:	Moxa Smartio/Industrio 4-port board at <a href="#">0x180 / IRQ 10</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14 (board1)

## M&C Serial IO Card Configuration 2

No. of boards:	2
No. of ports:	8
Board 1:	Moxa Smartio/Industrio 4-port board at <a href="#">0x180 / IRQ 10</a>
Board 2:	Moxa Smartio/Industrio 4-port board at <a href="#">0x200 / IRQ 5</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14 (board1) ttyS21, ttyS22, ttyS23, ttyS24 (board2)

## M&C Serial IO Card Configuration 3

No. of boards:	1
No. of ports:	8
Board 1:	Moxa Smartio/Industrio 8-port board at <a href="#">0x180 / IRQ 10</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)

## M&C Serial IO Card Configuration 4

No. of boards:	2
No. of ports:	12
Board 1:	Moxa Smartio/Industrio 8-port board at <a href="#">0x180 / IRQ 10</a>
Board 2:	Moxa Smartio/Industrio 4-port board at <a href="#">0x200 / IRQ 5</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) ttyS21, ttyS22, ttyS23, ttyS24 (board2)

## M&C Serial IO Card Configuration 5

No. of boards:	3
No. of ports:	16
Board 1:	Moxa Smartio/Industrio 8-port board at <a href="#">0x180 / IRQ 10</a>
Board 2:	Moxa Smartio/Industrio 4-port board at <a href="#">0x200 / IRQ 5</a>
Board 3:	Moxa Smartio/Industrio 4-port board at <a href="#">0x380 / IRQ 11</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) ttyS21, ttyS22, ttyS23, ttyS24 (board2)

ttyS31, ttyS32, ttyS33, ttyS34 (board3)
---

## M&C Serial IO Card Configuration 6

No. of boards:	2
No. of ports:	16
Board 1:	Moxa Smartio/Industrio 8-port board at <a href="#">0x180 / IRQ 10</a>
Board 2:	Moxa Smartio/Industrio 8-port board at <a href="#">0x200 / IRQ 5</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2)

## M&C Serial IO Card Configuration 7

No. of boards:	3
No. of ports:	20
Board 1:	Moxa Smartio/Industrio 8-port board at <a href="#">0x180 / IRQ 10</a>
Board 2:	Moxa Smartio/Industrio 8-port board at <a href="#">0x200 / IRQ 5</a>
Board 3:	Moxa Smartio/Industrio 4-port board at <a href="#">0x380 / IRQ 11</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2) ttyS31, ttyS32, ttyS33, ttyS34 (board3)

## M&C Serial IO Card Configuration 8

No. of boards:	3
No. of ports:	24
Board 1:	Moxa Smartio/Industrio 8-port board at <a href="#">0x180 / IRQ 10</a>
Board 2:	Moxa Smartio/Industrio 8-port board at <a href="#">0x200 / IRQ 5</a>
Board 3:	Moxa Smartio/Industrio 8-port board at <a href="#">0x380 / IRQ 11</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2) ttyS31, ttyS32, ttyS33, ttyS34, ttyS35, ttyS36, ttyS37, ttyS38 (board3)

## M&C Serial IO Card Configuration 9

No. of boards:	1
No. of ports:	8
Board 1:	Comtrol Rocketport board at <a href="#">0x180</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)

## M&C Serial IO Card Configuration 10

No. of boards:	2
No. of ports:	12
Board 1:	Comtrol Rocketport board at <a href="#">0x180</a>
Board 2:	Moxa Smartio/Industrio 4-port board at <a href="#">0x200 / IRQ 5</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)

ttyS21, ttyS22, ttyS23, ttyS24 (board2)
---

## M&C Serial IO Card Configuration 11

No. of boards:	3
No. of ports:	16
Board 1:	Comtrol Rocketport board at <a href="#">0x180</a>
Board 2:	Moxa Smartio/Industrio 4-port board at <a href="#">0x200 / IRQ 5</a>
Board 3:	Moxa Smartio/Industrio 4-port board at <a href="#">0x380 / IRQ 11</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) ttyS21, ttyS22, ttyS23, ttyS24 (board2) ttyS31, ttyS32, ttyS33, ttyS34 (board3)

## M&C Serial IO Card Configuration 12

No. of boards:	2
No. of ports:	16
Board 1:	Comtrol Rocketport board at <a href="#">0x180</a>
Board 2:	Comtrol Rocketport board at <a href="#">0x200</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2)

## M&C Serial IO Card Configuration 13

No. of boards:	3
No. of ports:	20
Board 1:	Comtrol Rocketport board at <a href="#">0x180</a>
Board 2:	Comtrol Rocketport board at <a href="#">0x200</a>
Board 3:	Moxa Smartio/Industrio 4-port board at <a href="#">0x380 / IRQ 11</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2) ttyS31, ttyS32, ttyS33, ttyS34 (board3)

## M&C Serial IO Card Configuration 14

No. of boards:	3
No. of ports:	24
Board 1:	Comtrol Rocketport board at <a href="#">0x180</a>
Board 2:	Comtrol Rocketport board at <a href="#">0x200</a>
Board 3:	Comtrol Rocketport board at <a href="#">0x380</a>
tty-names:	ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2) ttyS31, ttyS32, ttyS33, ttyS34, ttyS35, ttyS36, ttyS37, ttyS38 (board3)

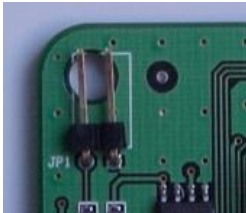
## Serial IO Hardware Setting (4-PORT / 1)

The first Moxa Smartio/Industrio 4-port board in a M&C system is operated at at 0x180 / IRQ 10, which is the factory default setting for these boards. So, usually the board can be used out of the box.



If you want to install a board which already has been configured to work as second or third board in a M&C system, you have to reset the IO/IRQ settings of this board. The following steps describe how to install the card into a running M&C system.

1. Shut down the M&C system, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).

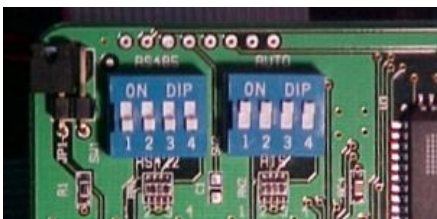


5. Switch on the unit.
6. Before the computer boots, insert the CD labeled 'MOXA configuration' into the computer's CD ROM drive. The computer will boot Free-DOS, a MS-DOS like operating system with this CD.
7. At the DOS prompt, enter 'MOXA'.
8. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
9. Set the port addresses and IRQs according to the table shown below:

IO Port	180	188	190	198
IRQ	10	10	10	10
Speed	Normal	Normal	Normal	Normal
Int. Vec.				

10. Press F10 to save the changes.
11. Remove the jumper from the board.
12. Close the housing and reboot the M&C system (CTRL+ALT+DEL)

The RS485 version of the 4-port card additionally has 4 jumpers to enable the line termination resistors and eight dip switches to select the behavior of the RS485/RS422 ports. The M&C system software uses a RS422 4-wire cabling with most of the equipment. The switch positions to operate all ports in RS422 mode is shown below:



The jumpers for enabling the termination resistors are placed beside the connector at the board's bracket. By closing the pins with a jumper, a termination resistor of 120 ohms gets placed across the receive lines of the port.

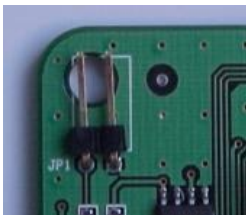


## Serial IO Hardware Setting (4-PORT / 2)

To install a Moxa Smartio/Industrio 4-port board in a M&C system as the second serial board, the IO port and IRQ settings of the board must be changed to 0x200 / IRQ 5 by means of the DOS based configuration utility shipped with the board.

The following steps describe how to install the card into a running M&C system.

1. Shut down the M&C system, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).

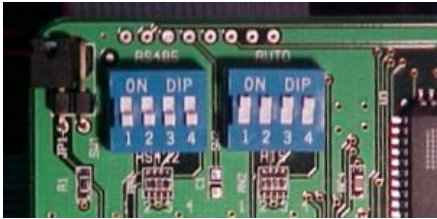


5. Switch on the unit.
6. Before the computer boots, insert the CD labeled 'MOXA configuration' into the computer's CD ROM drive. The computer will boot Free-DOS, a MS-DOS like operating system with this CD.
7. At the DOS prompt, enter MOXA
8. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
9. Set the port addresses and IRQs according to the table shown below:

IO Port	200	208	210	218
IRQ	5	5	5	5
Speed	Normal	Normal	Normal	Normal
Int. Vec.				

10. Press F10 to save the changes.
11. Remove the jumper from the board.
12. Close the housing and reboot the M&C system (CTRL+ALT+DEL)

The RS485 version of the 4-port card additionally has 4 jumpers to enable the line termination resistors and eight dip switches to select the behavior of the RS485/RS422 ports. The M&C system software uses a RS422 4-wire cabling with most of the equipment. The switch positions to operate all ports in RS422 mode is shown below:



The jumpers for enabling the termination resistors are placed beside the connector at the board's bracket. By closing the pins with a jumper, a termination resistor of 120 ohms gets placed across the receive lines of the port.

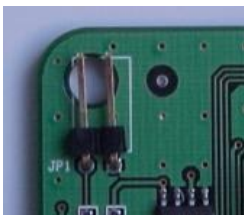


## Serial IO Hardware Setting (4-POR / 3)

To install a Moxa Smartio/Industrio 4-port board in a M&C system as the third serial board, the IO port and IRQ settings of the board must be changed to 0x380 / IRQ 11 by means of the DOS based configuration utility shipped with the board.

The following steps describe how to install the card into a running M&C system.

1. Shut down the M&C system, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).



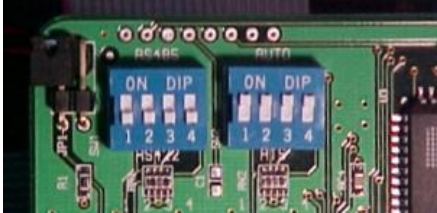
5. Switch on the unit.
6. Before the computer boots, insert the CD labeled 'MOXA configuration' into the computer's CD ROM drive. The computer will boot Free-DOS, a MS-DOS like operating system with this CD.
7. At the DOS prompt, enter MOXA
8. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
9. Set the port addresses and IRQs according to the table shown below:

IO Port	380	388	390	398
IRQ	11	11	11	11
Speed	Normal	Normal	Normal	Normal
Int. Vec.				

10. Press F10 to save the changes.
11. Remove the jumper from the board.

## 12. Close the housing and reboot the M&C system (CTRL+ALT+DEL)

The RS485 version of the 4-port card additionally has 4 jumpers to enable the line termination resistors and eight dip switches to select the behavior of the RS485/RS422 ports. The M&C system software uses a RS422 4-wire cabling with most of the equipment. The switch positions to operate all ports in RS422 mode is shown below:



The jumpers for enabling the termination resistors are placed beside the connector at the board's bracket. By closing the pins with a jumper, a termination resistor of 120 ohms gets placed across the receive lines of the port.

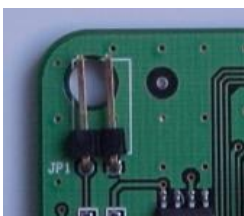


## Serial IO Hardware Setting (8-PORT / 1)

The first Moxa Smartio/Industrio 8-port board in a M&C system is operated at 0x180 / IRQ 10, which is the factory default setting for these boards. So, usually the board can be used out of the box.

If you want to install a board which already has been configured to work as second or third board in a M&C system, you have to reset the IO/IRQ settings of this board. The following steps describe how to install the card into a running M&C system.

1. Shut down the M&C system, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).



5. Switch on the unit.
6. Before the computer boots, insert the CD labeled 'MOXA configuration' into the computer's CD ROM drive. The computer will boot Free-DOS, a MS-DOS like operating system with this CD.
7. At the DOS prompt, enter MOXA
8. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
9. Set the port addresses and IRQs according to the table shown below:

IO Port	180	188	190	198	1A0	1A8	1B0	1B8
---------	-----	-----	-----	-----	-----	-----	-----	-----

IRQ	10	10	10	10	10	10	10	10
Speed	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Int. Vec.								

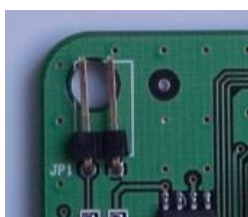
10. Press F10 to save the changes.
11. Remove the jumper from the board.
12. Close the housing and reboot the M&C system (CTRL+ALT+DEL)

## Serial IO Hardware Setting (8-PORT / 2)

To install a Moxa Smartio/Industrio 8-port board in a M&C system as the second serial board, the IO port and IRQ settings of the board must be changed to 0x200 / IRQ 5 by means of the DOS based configuration utility shipped with the board.

The following steps describe how to install the card into a running M&C system.

1. Shut down the M&C system, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).



5. Switch on the unit.
6. Before the computer boots, insert the CD labeled 'MOXA configuration' into the computer's CD ROM drive. The computer will boot Free-DOS, a MS-DOS like operating system with this CD.
7. At the DOS prompt, enter MOXA
8. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
9. Set the port addresses and IRQs according to the table shown below:

IO Port	200	208	210	218	220	228	230	238
IRQ	5	5	5	5	5	5	5	5
Speed	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Int. Vec.								

10. Press F10 to save the changes.
11. Remove the jumper from the board.
12. Close the housing and reboot the M&C system (CTRL+ALT+DEL)

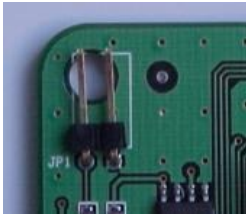
## Serial IO Hardware Setting (8-PORT / 3)

To install a Moxa Smartio/Industrio 8-port board in a M&C system as the third serial board, the IO port and IRQ settings of the board must be changed to 0x380 / IRQ 11 by means of the DOS based configuration utility shipped with the board.

The following steps describe how to install the card into a running M&C system.

1. Shut down the M&C system, switch it off.
2. Open the housing.
3. Install the board in a free slot.

4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).



5. Switch on the unit.
6. Before the computer boots, insert the CD labeled 'MOXA configuration' into the computer's CD ROM drive. The computer will boot Free-DOS, a MS-DOS like operating system with this CD.
7. At the DOS prompt, enter MOXA
8. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
9. Set the port addresses and IRQs according to the table shown below:

IO Port	380	388	390	398	3A0	3A8	3B0	3B8
IRQ	11	11	11	11	11	11	11	11
Speed	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Int. Vec.								

10. Press F10 to save the changes.
11. Remove the jumper from the board.
12. Close the housing and reboot the M&C system (CTRL+ALT+DEL)

## Serial IO Hardware Setting (ROCKET / 1)

The first Control Rocketport card in the M&C system computer are operated at 0x180, which is the factory default. If you want to install a board which already has been configured to work as second or third board in a M&C system, you have to reset the DIP switch settings as shown in the picture below:



## Serial IO Hardware Setting (ROCKET / 2)

To use a Control Rocketport card as the second serial board, the DIP switches on the board must be set to the configuration shown below:



Please note, that the use of a Rocketport card as the second board only is permissible if the first board in the M&C system also is a Control Rocketport.

## Serial IO Hardware Setting (ROCKET / 3)

To use a Control Rocketport card as the third serial board, the DIP switches on the board must be set to the configuration shown below:



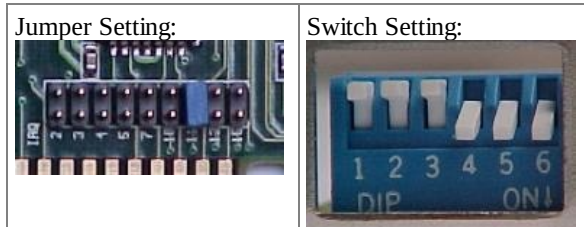
Please note, that the use of a Rocketport card as the third board only is permissible if both, the first and the second board also are Control Rocketport cards.



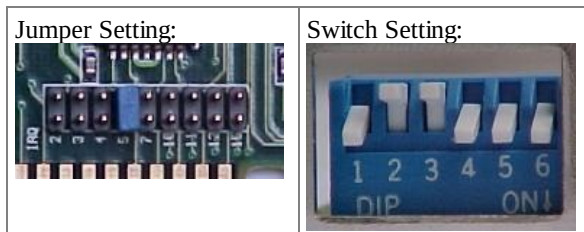
## Serial IO Hardware Setting (INTELLIO)

Moxa Intellio boards are configured by setting a jumper on the board to select the IRQ and a DIP switch located at the card's bracket. The table below shows the settings for this card.

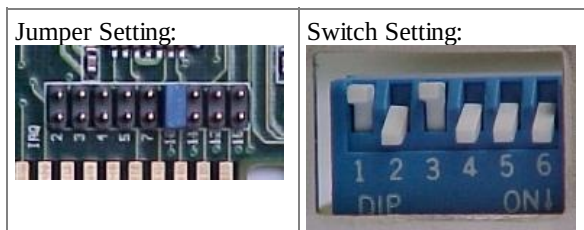
### Card 1 at 0xdc000, IRQ 11:



### Card 2 at 0xd8000, IRQ 5:



### Card 3 at 0xd4000, IRQ 10:



## A short introduction to 'vi'

*vi* is the standard text editor used on Unix systems. The M&C system being based on the Linux operating system uses an enhanced version of *vi*, called *vim* (*vi improved*). The paragraphs below give a short introduction how to use this text editor.

**NEW** The new version contains also the Midnight Commander with an integrated editor. type *mc* at the command prompt to start the file manager and type *mcedit filename*, where filename is the path to the file which you want to edit, to start the editor. While running MC you can browse through the directories of the system and manipulate files. Use the function keys F1 .. F10 or select the functions from the menu.

First of all, why to use *vi*? *vi* is known to be difficult to learn as it's concept is different as you might expect. There are other text editors available for Linux which are easier to handle. The answer is: *vi* turned out to be the only text editor program which works in a satisfying way when used in the Microsoft Windows telnet client. If you are going to maintain and configure a **sat-nms** network management system, you will find it comfortable even to do configuration jobs from your desk.

The most important difference between text editors like the 'notepad' known from the MS Windows operating system and *vi* is the modal behavior of *vi*. This means, *vi* treats keystrokes in a different way, depending on it's current mode. The two most important modes of *vi* are the COMMAND mode and the INSERT mode

In COMMAND mode, each keystroke tells the editor to do something. Even plain characters are commands

rather than they are inserted into the text. The advantage of this COMMAND mode is that you can operate the editor without any special keys arrows or function keys.

In contrast, the INSERT mode lets you enter text but no commands. You have to switch between these modes while you are editing a text. Early versions of *vi* really didn't provide any commands while in INSERT mode. *vim* is much more flexible with this, e.g. you may move around the text using the cursor keys, even if you are in INSERT mode.

The *vi* editor contains a extensive online help manual which you can view from within the editor. Type the **ESC** key, followed by **:h** and **ENTER**. The editor splits the window and shows the online help in the upper part. Type **:q** to remove the help again.

```

VIM - help.txt
help.txt* For Vim version 5.3. Last modification: 1998 Aug 23

      VIM - main help file

Move around: Use the cursor keys, or "h" to go left,      k  l
              "j" to go down, "k" to go up, "l" to go right.  j

Close this window: Use ":q<Enter>".
Get out of Vim: Use ":qa!<Enter>" (careful, all changes are lost!).
Jump to a subject: Position the cursor on a tag between |bars| and hit CTRL-].
With the mouse:  ":set mouse=a" to enable the mouse (in xterm or GUI).
                  Double-click the left mouse button on a tag between |bars|.
jump back:      Type CTRL-T or CTRL-O.
Get specific help: It is possible to go directly to whatever you want help
on, by giving an argument to the ":help" command |:help|.
It is possible to further specify the context:
      WHAT          PREPEND      EXAMPLE      "
Normal mode commands (nothing)  :help x
Visual mode commands v_        :help v_u
Insert mode commands  i_        :help i_<Esc>

help.txt [help][R0] 1,1
#
/backup/vlcrroot/etc/rc.vlc [R0] 1,1
"help.txt" [R0] 1185L, 55790C
  
```

The [following chapter](#) lists the most frequently used commands for the *vi* editor as a reference.

## Common commands

The table below lists some frequently used commands for the *vi* editor. Please note that all the commands except **ESC** must be typed in COMMAND mode. This means if the editor is in another mode than the COMMAND mode, you have to press the **ESC** key first.

Commands starting with a colon are so called 'ex commands' which are entered in the command / status line at the bottom of the terminal window. As soon as you press the colon character in COMMAND mode, the cursor jumps to the bottom line and lets you edit the command. Press **ENTER** to complete the command or **ESC** to return to COMMAND mode without changing anything.

	<i>Mode changes</i>
<b>ESC</b>	Leave the INSERT mode, revert to COMMAND mode.
<b>i</b>	Go to INSERT mode
	<i>Cursor movements</i>
<b>k</b>	Up
<b>j</b>	Down
<b>h</b>	Left
<b>l</b>	Right
<b>0</b>	Start of line
<b>\$</b>	End of line
<b>gg</b>	First line of the text
<b>G</b>	Last line of the text

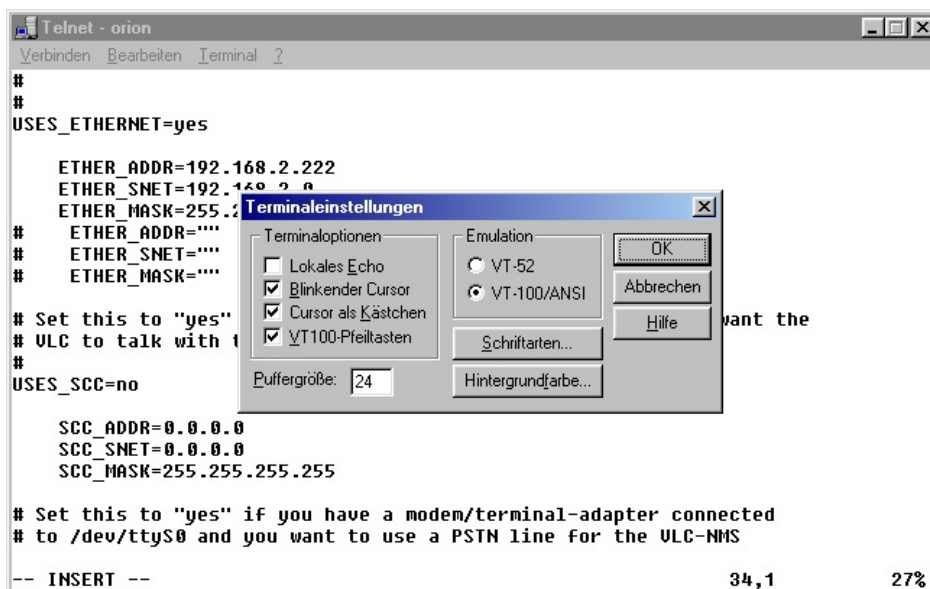


	<i>Block / range commands</i>
<b>v</b>	Start <i>visual</i> mode, this marks the block start
<b>y</b>	Yank the marked block into the paste buffer.
<b>x</b>	Yank the marked block and delete it from the text.
<b>P</b>	Paste the contents of the buffer before the cursor position. <i>te</i>
	<i>File / buffer commands</i>
<b>:qa!</b>	Quit, abandon all changes.
<b>:xa</b>	Exit, save changes.
<b>:e file-name</b>	Edit a file in a separate buffer.
<b>:bn</b>	Step through buffers.
	<i>Find / replace commands</i>
<b>/ pattern</b>	Goto the next occurrence of 'pattern'.
<b>N</b>	Repeat the last search.
<b>:%s/pattern/text/gc</b>	Replace each occurrence of 'pattern' in the document with 'text'. Ask for confirmation before executing each replace.

You normally will use the cursor keys at your keyboard for moving in the text rather than typing the commands shown in the table above. If however the cursor keys do not work for some reason, knowing the command characters may be very helpful.

## 'vi' in the MS Windows telnet client

To make the MS Windows telnet client work well with the *vi* editor, you should configure the telnet client as shown below.



it is important to have the following parameters set:

- No local echo selected.
- The VT100/ANSI emulation chosen.
- The buffer size set to 24 lines.
- VT100 cursor keys enabled.

With these settings you get most comfortable control about the *vi* editor in the telnet window. Text scrolling

works as you expect with a buffer size of 24 lines, with the VT100 cursor keys enabled you can move in the text even in INSERT mode.

The keys 'Ins', 'Del', 'Pos1', 'End', 'Pg Up' and 'Pg Dn' do not work. You should not try to use them as they might insert strange characters in the text instead of doing the function you expect.